

**Aeromedical Evacuation**  
**A GUIDE FOR HEALTH CARE PROVIDERS**

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um range distances. The C-9A is the only aircraft specifically designed for AE and is the best available aircraft for the aeromedical transfer of patients in existence today. The modern features of the C-9A include a special care area (intensive care and isolation of infectious diseases), medical service area, central storage area, medical crew stations, and communication and call systems. It can carry up to 40 patients in mixed litter and ambulatory configuration.

**b. C-141B Starlifter.** This multipurpose aircraft is primarily designed for airlifting cargo. It is used for strategic AE missions in peacetime and wartime. In wartime and emergency situations, it can carry troops, supplies, and cargo into a combat or troubled areas, and after reconfiguration, return with sick and injured patients. The configuration or adaptation of this aircraft, enables the transport of large numbers of patients. It can be configured to carry up to a maximum of 103 litter patients, at least 146 ambulatory patients, or any mix of litter and ambulatory patients.

**c. C-130 Hercules.** Like the C-141B, the C-130 is a multimission aircraft. It is the largest turbo prop driven cargo aircraft in the Air Force inventory. It will be used as the primary aircraft for tactical AE purposes in the combat zone, and is a backup for C-9As in the three intra-theater areas. It can carry up to 74 litter patients, 86 ambulatory patients, or any mix of litter and ambulatory patients.

**★d. C-21 aircraft.** The C-21 is primarily an operational support aircraft. It can be used to transport ill or injured patients based on availability and only with the concurrence of the HQ MAC/SGO or overseas theater flight surgeon. It can be configured to seven seats. There is space for two litter patients. It is recommended only one litter patient be carried at a time. One litter allows for two to three medical and non-medical attendants. Patients not normally transported on a C-21 are listed in MACR 55-21(C1), chapter 15, paragraph 15-18c. This request may be waived for individual patients by HQ MAC/SGO.

**★e. Other Aircraft.** In unusual situations, C-5, CT-39, C-12, and KC-135 aircraft can be used. Also, the Civil Reserve Air Fleet (CRAF) may be required to transport both litter and ambulatory patients during wartime.

**4. Selection of Patients.** The physician at the originating medical facility must determine which patients require AE for more definitive

treatment. Although there are no absolute contraindications to AE, patients should be as medically stable and as fully protected against the stresses imposed by flight as possible (see sections C and D).

**5. Classification of Patients.** Patient classification is determined by the physician at the originating facility according to tri-service regulation AFR 164-5/AR 40-535/OPNAVINST 4630.9C/MCO P4630.9A. Patient classification is critical in identifying to the medical aircrew patients who must travel on a litter or in ambulatory status, and whether able to assist themselves during an aircraft emergency. During contingency operations or anytime it is the classification categories under AFR 164-5 originating medical treatment facilities' responsibility to manifest patients by using a DD Form 601, Patient Evacuation Manifest, the patient and attendant classification codes listed in AFR 164-5/AR 40-535/OPNAVINST 4630.9C/MCO P4630.9A will be used. During normal peacetime operations, the following patient and attendant classification codes will be used:

**a. Class 1—Neuropsychiatric Patients:**

(1) Class 1A—Acutely ill psychiatric patients who require close supervision. These patients must be sedated before a flight, restrained by leather ankle and wrist restraints, dressed in hospital clothing, and on a correctly prepared litter.

(2) Class 1B—Moderately ill psychiatric patient. These patients should be sedated before a flight, dressed in hospital clothing, and on a correctly prepared litter.

NOTE: Restraints will be provided by the originating facility and available for use if necessary.

(3) Class 1C—Ambulatory psychiatric patients who are cooperative and have proved reliable under observation.

**b. Class 2—Litter Patients (Other Than Psychiatric).**

NOTE: If patients require a rest during a long flight because of recent surgery or have difficulty safely ambulating, they should be classified as litter patients.

(1) Class 2A—A litter patient who may not, or cannot, ambulate and who is dependent on another person in an aircraft emergency. This patient should be dressed in hospital clothing and be on a properly prepared litter.

(2) Class 2B—A litter patient who is able to ambulate and sit in an aircraft seat if a seat is available. This patient is enplaned and deplaned

ona properly prepared litter and should be dressed in hospital clothing.

c. **Class 3—Ambulatory Patients (Nonpsychiatric).** These patients may require some medical treatment, care, assistance, or observation during flight.

d. **Class 4—Ambulatory Patients (Nonpsychiatric).** Patients who require no care during flight.

e. **Class 5—Medical Attendant (Physician, Nurse, or Corpsman).** Attendants who are in addition to the basic aeromedical crew.

f. **Class 6—Nonmedical Attendant.**

**6. Movement Precedence.** The movement precedence will determine how quickly the patient will be picked up and moved by the AE system. It is determined by the physician at the originating facility. Precedence categories are urgent, priority, and routine:

a. **Urgent—**Patients categorized as “urgent” require emergency movement to save life or limb or prevent serious complications. Aircraft will be launched or diverted to pick up and deliver the patient to the destination as soon as possible. NOTE: Psychiatric or terminal patients are not considered “urgent” patients.

b. **Priority—**Patients categorized as “priority” require prompt medical care not available locally. Patients will be picked up within 24 hours and delivered with the least possible delay. NOTE: Patients may be subject to several en route stops.

c. **Routine—**Patients will be picked up within 72 hours and moved on routine or scheduled flights. Because of the routing of the AE system, patients may be required to fly for more than 1 day and remain overnight in an aeromedical staging facility (ASF) or holding ward.

d. **Special Patient.** A “special patient” is any patient considered to be at significant risk while being aeromedically evacuated. A “special patient” may be of routine precedence whose movement may not be time sensitive, but who may require special expertise or teams, special nursing care, special equipment, or special procedures. The AECC identifies special patients based on clinical facts and concerns. The AECC discusses each case with the 375 AAW/SG or the respective theater validating and consulting flight surgeon before the move. Urgent and priority precedence may automatically designate special patients. The Flight Clinical Coordinator, a nurse with special training and experience in operational and medical aspects of aeromedical

evacuation, coordinates medical preparation for special patients.

**7. Role of Validating and Consulting Flight Surgeons.** The 375 AAW/SG is the central medical manager and validator or consultant for world-wide AE of DOD patients or battle casualties. However, within the European Command (EUCOM) and the Pacific Command (PACOM) regions, the responsibility for validation and consultation is delegated to the respective US Air Force theater surgeons. The 375 AAW/SG must remain actively involved in, and informed of, all significant day-to-day happenings in AE. Each AECC will seek validation for all urgent patients and consultation for all priority and special category patients from their designated validating or consulting flight surgeon before such patient moves are planned and executed. The validation or consultation process includes sharing medical information from the originating physician, and achieving mutual agreement and coordination of a suitable method of movement. Validating and consulting flight surgeons are familiar with all aspects of the AE system, including resources, operations, capabilities, and limitations. They help integrate the originating physician's identified needs for his or her patients with available AE capability for transfer of critically ill or injured patients. They also serve as consultants to the AECCs for other medical concerns relating to AE; for example, assistance with in-flight medical emergencies. Locations and responsibilities of validating and consulting flight surgeons are:

a. **CONUS.** The 375 AAW/SG, Scott AFB IL, is responsible for CONUS AE missions and strategic AE missions originating in the Azores, Greenland, Iceland, Alaska, South and Central America, Bermuda, and the Caribbean. The SG coordinates with the respective US Air Force theater surgeons and AECCs regarding strategic missions between CONUS and Europe and the Pacific.

b. **Europe.** In EUCOM, the flight surgeons at the USAF Clinic Rhein-Main AB GE, are designated by the USAFE surgeon to assist the 2nd AES with AE requirements in Europe, Africa, and the Middle East.

c. **Pacific.** In PACOM, the flight surgeons at USAF Regional Medical Center Clark AB RP, and the PACAF/SG flight surgeons are designated by the PACOM surgeon to assist the 9th AES, Clark AB RP, with AE requirements in the Pacific Ocean region, most of the Indian

Ocean region (to 60° East longitude), Far East, Near East, Central Asia, and Australia.

**d. Alaska.** Initial validation by the Alaskan Air Command Surgeon (AAC/SG).

**e. South and Central America.** Initial validation by the Southern Air Division/SG (USAF Clinic Howard/SG), Panama.

**8. Process of Evacuation.** The process of moving a patient by air may be complex and may require as many as 5 days from the point of

origin until the patient reaches the designation medical treatment facility.

**a. Wartime.** The AE system exists primarily for the wartime evacuation of patients from the battle zone (see DOD 4515.13-R). Patients are first brought from the combat zone to the forward treatment facility by ambulance or helicopter where they are initially treated and stabilized. Patients who cannot be returned to duty and who need definitive or long-term care are evacuated to



may vary based on the length of the flight, type of aircraft, and individual patient variables. The effects of the in-flight environment on specific organ systems are outlined below:

**a. Pulmonary and Chest Disorders:**

(1) Respiratory Embarrassment. Because of decreased  $P_{O_2}$  at altitude, certain patients with respiratory compromise may benefit from supplemental  $O_2$ , especially on flights of long duration. A thorough preflight evaluation (to include pulmonary function tests and blood determination) is important in assessing a compromised lung patient's ability to compensate at altitude. A good predictor is the maximum voluntary ventilation. If there is evidence that a patient will have significant desaturation at altitude, supplemental  $O_2$  should be provided in flight. Because of the low humidity, inspired air should be humidified. On rare occasions, certain patients (such as, restrictive lung disease patients) will clearly benefit from an altitude restriction. Any question concerning altitude restriction should be discussed with the validating or consulting flight surgeon.

(2) Pneumothorax. Patients with pneumothorax (any degree) are at increased risk at altitude because of gas expansion. Such patients must have a chest tube with a Heimlich valve (one-way flutter valve) in place before a flight.

**b. ENT Problems (Otorhinolaryngology).** Because of decreased atmospheric pressure and the associated volume changes, any compromise in the upper respiratory tract may prevent ventilation of the middle ear or sinuses. The resultant barotrauma can be acutely painful. Preflight preparations should include evaluation and appropriate precautionary measures, to include myringotomy if necessary. The AE crew should be made aware of any ear or sinus problems in patients.

**c. Maxillofacial Injuries.** These injuries are often associated with upper airway problems due to injury or secondary to fixation devices. In addition to stabilizing the airway, a variety of bands and arches are used to fix the mandible to the maxilla. If such fixation devices are used, they must have quick release capability or scissors (wire cutters) available in the event of motion sickness.

**d. Hematologic Problems.** Any problems in the blood oxygen carrying capacity may result in hypoxemia. A near normal HCT is always desirable. An acutely low HCT is tolerated less well at altitude than a chronically low HCT. As

a general rule, if Hgb or HCT is sufficiently low (Hgb 7 Gm or HCT 21 percent), the patient should be given preflight transfusion until the HCT is at least 30 percent. In addition, supplemental  $O_2$  should be ordered. A cabin altitude restriction may be considered if indicated. Active bleeding must be controlled before a flight.

**e. Orthopedic Problems.** Fractures must be securely splinted or immobilized before a flight. The Collins (spring type) traction is the most desirable. Pneumatic splints are absolutely contraindicated because of changes in pressure or volume.

(1) Casts. Newly applied casts should be observed for 48 to 72 hours to allow the swelling to disappear and to make sure there are no circulatory problems. All casts should be bivalved if possible.

(2) Weights. Free hanging weights for traction are absolutely contraindicated. They should be disconnected and replaced with Collins traction during transport.

**f. Spinal Column or Spinal Cord Injuries.** Following stabilization, spinal cord patients should be moved to the nearest spinal cord center as soon as possible. The Stryker frame is ideal for such movements. The movement of such patients should be well planned and coordinated in advance. Traction with swinging weights is contraindicated. Collins traction should be used.

**g. Ophthalmologic Problems:**

(1) Postsurgery. Patients should be evaluated thoroughly before a flight for evidence of sufficient healing or resolution.

(2) Patients with any acute problem to the retinal circulation (via retinal detachment, etc.) must be provided supplemental  $O_2$ .

(3) The eye is essentially a fluid filled organ. Surgery can sometimes introduce air into the globe. Altitude restrictions may be warranted in these cases.

**h. Cardiovascular Problems.** Cardiac patients generally do well in flight if provided supplemental  $O_2$ . Hypoxia can precipitate angina or cause cardiac irritability with associated arrhythmias. These patients should be thoroughly evaluated before a flight and necessary supplemental  $O_2$  and medications ordered. Patients with acute myocardial infarction should be stabilized before movement.

**i. Pregnancy.** The potential for premature birth in an uncontrolled environment must be considered. If evacuation is to be done after 240

days of gestation, it should be well coordinated. The patient should be accompanied by a trained professional if labor is imminent in the judgment of the attending obstetrician.

**j. Psychiatric Problems.** Unpredictable behavior of psychiatric patients could present a special hazard to other patients, the aircrew, and the patients themselves. If necessary, patients should be on a litter and restrained, with emphasis on "pharmacological" restraint and then physical restraint if indicated. Consider the aircraft environment at 35,000 feet and premedicate accordingly.

**k. Burns.** Patients with severe burns require the same intensive care in the air as they do on the ground. The aircraft environment may further endanger the burn patients because of dehydration and exposure to infection without proper preflight preparation. When possible, an experienced burn team should accompany a seriously burned individual. Before a flight the patient should:

- (1) Have a secure airway.
- (2) Have a tube in place.
- (3) Be well hydrated.
- (4) Be well medicated.
- (5) Be wrapped.

NOTE: Burn patients should be categorized as "urgent."

**l. Pediatrics.**

(1) **Small Children.** It is highly desirable for parents to accompany a small child to help care for and to reassure the child.

(2) **Neonates.** Because of their delicate respiratory and fluid volume status, these patients should be accompanied by a skilled neonatal transport team. Neonatal teams can significantly reduce the infant mortality rate in such situations. These patients are normally moved as urgent category patients.

**m. Surgery.** A week after surgery patients should be stable and not require IVs, tubes, etc. The DD Form 602 should clearly indicate the status of wounds, and appropriate care of such wounds.

**n. Quadriplegic Patients.** These patients are difficult to assess in-flight and, therefore, must be given a thorough preflight evaluation.

NOTE: Pay particular attention to the following: IVs, nasogastric tubes, tracheostomy tubes, catheters, and decubitus ulcers.

**20. Wartime Aeromedical Evacuation (AE).** The wartime AE environment is more austere, and suboptimal movements are often necessary. Be-

cause of the logistical limitations of battlefield medicine, each theater has developed an evacuation policy based on manpower and materiel limitations. If a patient cannot be returned to duty within the time frame designated by the theater surgeon, the patient may be aeromedically evacuated, regardless of his or her condition. Under such conditions, the availability of a bed for the next anticipated casualty may outweigh the need for more definitive care; therefore, it is even more important to stabilize the patient as much as possible before movement. During wartime, dedicated aeromedical airlift may not be possible and the aircraft may be carrying other personnel and supplies. The problem of limited space, noise, and poor lighting are compounded in this situation and present a challenge for even the most experienced physician. However, the principles of peacetime AE can be applied equally well in wartime: Stabilize—select—preflight—transfer.

**Section E—Medications, Diets, Supplies, and Equipment**

**21. General Information.** Physicians and other health care providers at the originating medical facility must give careful, advanced consideration to the types and amounts of medications, special diets, supplies, and equipment required to support each patient during AE. Provisions must be made for all items to support the orders written on the DD Form 602. Medical crewmembers carry very limited medications and supplies (see paragraph 23). Medical equipment used in flight must be approved by the USAF School of Aerospace Medicine for safety and compatibility with the aircraft environment (see paragraph 24).

**22. Items To Be Provided by Originating Medical Treatment Facilities:**

**a. Medications.** Provide a 3-day (intratheater) or a 5-day intertheater supply of medications ordered on the DD Form 602. The exception to this is narcotics (see paragraph 23). Avoid packing medications in patient's luggage where they are inaccessible.

**b. IV Solutions.** Provide a 3- to 5-day supply of the type of IV solutions ordered on the DD Form 602.

NOTE: IVs must be freshly started, preferably with a well-secured intravenous catheter before a flight.



★c. **Supplements/Tube Feeding/Infant Formula.** Provide a 3-day (intratheater) or 5-day (intertheater) supply of commercial tube feedings not requiring refrigeration. Provide a 24-hour supply of all MTF-prepared tube feedings requiring refrigeration. Provide directions for administering formula to include commercial name, total cc, total calories, strength, and rate of flow. Provide missing instructions if necessary.

★d. **Special Diets.** Therapeutic diets will be provided by a originating MTFs for patients who are added-on after regular scheduling has been completed. Therapeutic diets for all scheduled patients will be provided IAW AFR 166-6

by specified MTFs nearest the base where the flight originates. Order infant/pediatric diets for children under 3 years old by specifying a therapeutic diet requirement; e.g., "Diet for 1 1/2 year old." Provide infant formula as in paragraph 22c above.

e. **Dressings.** Provide adequate supply to reinforce burn dressings or those covering draining wounds. Dressings are not routinely changed in flight, only reinforced, due to the environment.

f. **Drainage Bags**—(such as colostomy bags for 3 to 5 days). Remember drainage can increase at altitude.

g. **Fully Prepared Litter (as required).** A fully prepared litter includes a mattress, pillow, pillow-

